

**ABSTRACT**

A folded cavity semiconductor optical amplifier is provided that includes a first mirror disposed on a substrate of semiconductor material and an active region formed thereon consisting of an optical cavity with a gain medium. The optical cavity being disposed adjacent the first mirror. A second mirror is formed and disposed on the active region on a surface opposite the first mirror. The active region of the amplifier includes input and output portions formed in one or both mirrors. The input and output portions formed from layers of reduced reflectivity relative to the first or second mirror and a longitudinal waveguide connecting the input and output portions to allow for light to be amplified to enter at the input port, travel through the vertical cavity and longitudinal waveguide, and exit as amplified light at the output portion of the waveguide structure.

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